This bachelor thesis concerns the Monte Carlo localization on a graph. Topics researched and solved were: movement of particles on the graph, generating particles on the edge of the graph according to the last measurements, correction from localization errors, evaluation of particles based on a different types of sensors and creation of the graph from a freely available map. The utilization of the graph as a map of environment and appropriately designed movement of particles on the graph make global localization of an autonomous robot in the environment easier.

The implementation was tested on a real set of data from several autonomous robots. As a result, it was observed that movement of particles on edges of the graph well represents the movement of the robot on real paths and ensures high resistancy against senzor errors.